



Competency Based Learning Materials (CBLMs)

Web Design

Level-3

Module 6: Working with Front-end Framework

Code: CBLM-ICT-WD-06-L3-EN-V1



National Skills Development Authority
Prime Minister's Office
Government of the People's Republic of Bangladesh

Copyright

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The CBLM on “Working with Front-end-Framework” is developed based on NSDA approved Competency Standards and Competency Based Curriculum under Web Design Level-3 Occupation. It contains the information required to implement the Web Design Level-3 standard.

This document has been prepared by NSDA with the help of relevant experts, trainers/professionals.

All Government-Private-NGO training institutes in the country accredited by NSDA can use this CBLM to implement skill-based training of Web Design level-3 course.

How to use this Competency Based Learning Materials (CBLMs)

The module, Working with Front-end Framework contains training materials and activities for you to complete. These activities may be completed as part of structured classroom activities or you may be required you to work at your own pace. These activities will ask you to complete associated learning and practice activities in order to gain knowledge and skills you need to achieve the learning outcomes.

1. Review the **Learning Activity** page to understand the sequence of learning activities you will undergo. This page will serve as your road map towards the achievement of competence.
2. Read the **Information Sheets**. This will give you an understanding of the jobs or tasks you are going to learn how to do. Once you have finished reading the **Information Sheets** complete the questions in the **Self-Check**.
3. **Self-Checks** are found after each **Information Sheet**. **Self-Checks** are designed to help you know how you are progressing. If you are unable to answer the questions in the **Self-Check** you will need to re-read the relevant **Information Sheet**. Once you have completed all the questions check your answers by reading the relevant **Answer Keys** found at the end of this module.
4. Next move on to the **Job Sheets**. **Job Sheets** provide detailed information about *how to do the job* you are being trained in. Some **Job Sheets** will also have a series of **Activity Sheets**. These sheets have been designed to introduce you to the job step by step. This is where you will apply the new knowledge you gained by reading the Information Sheets. This is your opportunity to practice the job. You may need to practice the job or activity several times before you become competent.
5. Specification **sheets**, specifying the details of the job to be performed will be provided where appropriate.
6. A review of competency is provided on the last page to help remind if all the required assessment criteria have been met. This record is for your own information and guidance and is not an official record of competency

When working through this Module always be aware of your safety and the safety of others in the training room. Should you require assistance or clarification please consult your trainer or facilitator.

When you have satisfactorily completed all the Jobs and/or Activities outlined in this module, an assessment event will be scheduled to assess if you have achieved competency in the specified learning outcomes. You will then be ready to move onto the next Unit of Competency or Module

Approved by

---th Executive Committee (EC) Meeting of NSDA

Held on -----

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Module Content

Unit Title: Work with Front-end Framework

Unit Code: OU- ICT-WD-06-L3-V1

Module Title: Working with Front-end Framework

Module Descriptor: This module encompasses knowledge, skills, and attitudes (KAS) to establish Front-end Framework work. It specially includes interpreting responsive websites, front-end framework components, and using Bootstrap to create layouts.

Nominal Hours: 55

Learning Outcomes:

Upon completion of this module the trainees will be able to:

1. Interpret responsive website
2. Interpret front-end framework components
3. Use bootstrap to create layout

Assessment Criteria:

1. Responsive website is interpreted.
2. Advantages of Frontend Framework in responsive website is interpreted.
3. Bootstrap Front-end framework is selected
4. Bootstrap documentation is interpreted
5. Fundamentals of Bootstrap is interpreted.
6. Bootstrap is integrated.
7. Bootstrap components are used
8. Mockup is created
9. Mockup is tested and presented

Learning Outcome 1: Interpret responsive website

Assessment Criteria	<ol style="list-style-type: none"> 1. Responsive website is interpreted. 2. Advantages of Frontend Framework in responsive website is interpreted.
Conditions and Resources	<ol style="list-style-type: none"> 1. Applicable tools, utensils, and equipment as prescribed by competency standards. 2. Supply materials 3. Relevant ingredients 4. CBLM related to the learning outcome. 5. Instructions, job sheets, activity sheets, and standard operating procedures 6. Personal protective equipment 7. Module/reference
Contents	<ol style="list-style-type: none"> 1. Responsive Website Design 2. The Advantages of Frontend Frameworks in Responsive Websites
Learning Materials	<ol style="list-style-type: none"> 1. CBLM 2. Handouts 3. Books, Manuals 4. Module/ Reference 5. Paper 6. Pen
Training Methods	<ol style="list-style-type: none"> 1. Discussion 2. Presentation 3. Demonstration 4. Guided Practice 5. Individual Practice 6. Project Work 7. Problem Solving 8. Brainstorming
Assessment Methods	<ol style="list-style-type: none"> 1. Written Test 2. Demonstration 3. Oral Questioning

Learning Experience: Interpret responsive website

You must perform the learning steps below to achieve the objectives stated in this learning guide. Beside each step are the resources or special instructions you will use to accomplish the corresponding activity.

Learning Steps	Resources specific instructions
1. Students will ask the instructor about work with front-end-framework	1. The instructor will provide the learning materials for interpret responsive website.
2. Read the Information sheet/s	2. Information Sheet No: 1 interpret responsive website
3. Complete the Self-Checks & Answer key sheets.	3. Self-Check No 1: interpret responsive website Answer key No 1: interpret responsive website
4. Read the Job/ Task sheet and Specification Sheet	4. Job/ task sheet and specification sheet

Information Sheet 1: Interpret responsive website

Learning Objective:

After completion of this information sheet, the learners will be able to explain, define and interpret the following contents:

- 1.1 Understanding Responsive Website Design
- 1.2 Exploring the Advantages of Frontend Frameworks in Responsive Websites

1.1 Understanding Responsive Website Design

A responsive website refers to a website that is designed and developed to provide an optimal viewing and user experience across different devices and screen sizes. When a website is responsive, its layout and content dynamically adjust and adapt to fit the screen size of the device on which it is being accessed, whether it's a desktop computer, laptop, tablet, or smartphone.



Responsive web design aims to eliminate the need for separate versions of a website for different devices. Instead, a single website can be created that automatically adjusts its appearance and functionality based on the device being used. This ensures that users have a consistent and user-friendly experience, regardless of the device they are using to access the website.

The interpretation of a responsive website involves using techniques such as flexible grid layouts, responsive images, and CSS media queries to adapt the website's design and content to different screen sizes. By utilizing these techniques, the website can reflow, resize, hide or display elements, and adjust typography to ensure readability and usability across various devices.

Overall, the primary goal of creating a responsive website is to provide an optimal user experience and ensure that visitors can easily navigate, interact with, and consume content on the website, regardless of the device they are using.

1.1.1 How Responsive Websites Work

A typical website is comprised of a set of files (each web page—home page, about page, etc.—is an individual file). Each file contains HTML code and content (text and images). Web pages are styled with files called Cascading Style Sheets (CSS). For ease of explanation, let's say that a standard (non-responsive) website has a set of files and a few CSS files that govern the look of the site. A responsive website applies an alternate set of CSS files depending on the device being used to access the site. The site looks and 'responds' differently based on the device.

For example, while someone viewing the site from a desktop device sees a horizontally aligned navigation menu, someone viewing the site from a mobile device gets a vertically aligned navigation menu with larger text that is easier to read on a smaller screen.

1.1.2 Why Responsive Web Design Is Important

There was a time when people only accessed websites from a desktop computer. The vast majority had the same size monitor. Websites were designed for the average visitor. Today, people access websites from a variety of different devices with screens ranging from a few inches all the way up to 27" or more and expectations have changed. Consumers expect the website they're visiting to know that they're using a tablet vs. a PC. They expect the site to adjust to them—not the other way around.

Different devices also come with different expectations in terms of usability. For example, the Apple iPhone has "trained" people to expect to be able to swipe left/right/up/down. People visiting a website from a smartphone expect to be able to click a phone number and have their phone give them the option of auto-dialing that number. Similarly, they expect an address to have a "click for directions" option that uses their phone's GPS.

A site that is responsive takes all of this into account and automatically adjust to provide visitors with the best possible user experience regardless of the device being used to access the site.

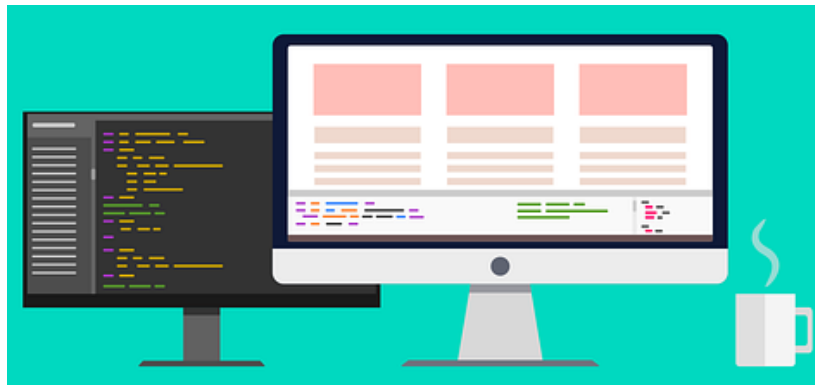
1.2 Exploring the Advantages of Frontend Frameworks in Responsive Websites

1.2.1 A Comprehensive Guide to Best Front-End Framework

As a developer, you understand the importance of using the right tools to do the job quickly and efficiently. That's why choosing the best front-end framework, such as Ext JS, for your projects is crucial. In this comprehensive guide, we'll explore what front-end frameworks are, why they're essential, and their benefits, such as accelerated development speed, low code, easy maintenance, and two-way data binding.

We'll also discuss the factors to consider when selecting a front-end framework, such as core features, popularity, usability, and mobile development support. Finally, we'll introduce you to Sencha Ext JS, the best front-end framework, highlighting its features, including grid, pivot grid, exporter, layouts, D3 adapter, and charts.

So, let's dive in and discover everything you need to know about the best front-end framework!



1.2.2 What Are Front-End Frameworks?

Front-end frameworks are essential for web developers as they help them create user interfaces (UIs) more efficiently and effectively. Essentially, front-end frameworks are sets of pre-written code and tools that developers use to build the UI of a website.

These frameworks consist of HTML, CSS, and JavaScript components that developers can use to create responsive layouts, dynamic user interfaces, and interactive web applications.

Front-end frameworks provide a foundation for developers, allowing them to focus on building unique features and functionality to make their websites stand out. Moreover, these frameworks also help ensure that the website's UI is consistent across different browsers and devices, making it easier for users to navigate and use.

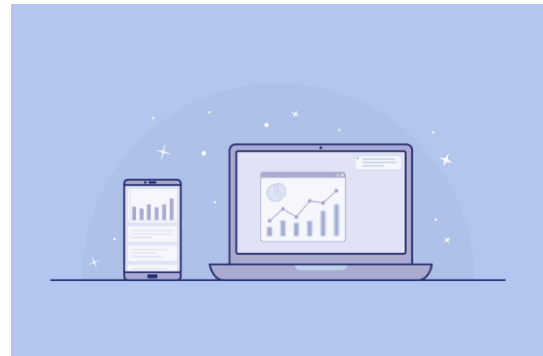
Web front-end frameworks also come with various pre-built templates, modules, and plugins, which developers can use to speed up their development process. And, this is particularly useful when creating complex web applications that require a lot of different components.



1.2.3 Why Is a Front-End Framework Crucial?

A front-end framework is a crucial tool for developers because it speeds up the development process, provides consistency in the code, and is designed to be responsive.

Without a front-end framework, developers would have to start from scratch each time they create a new project. Furthermore, it can be time-consuming and tedious.



A front-end framework, on the other hand, provides a structure that allows developers to focus on the functionality of the application rather than the underlying code.

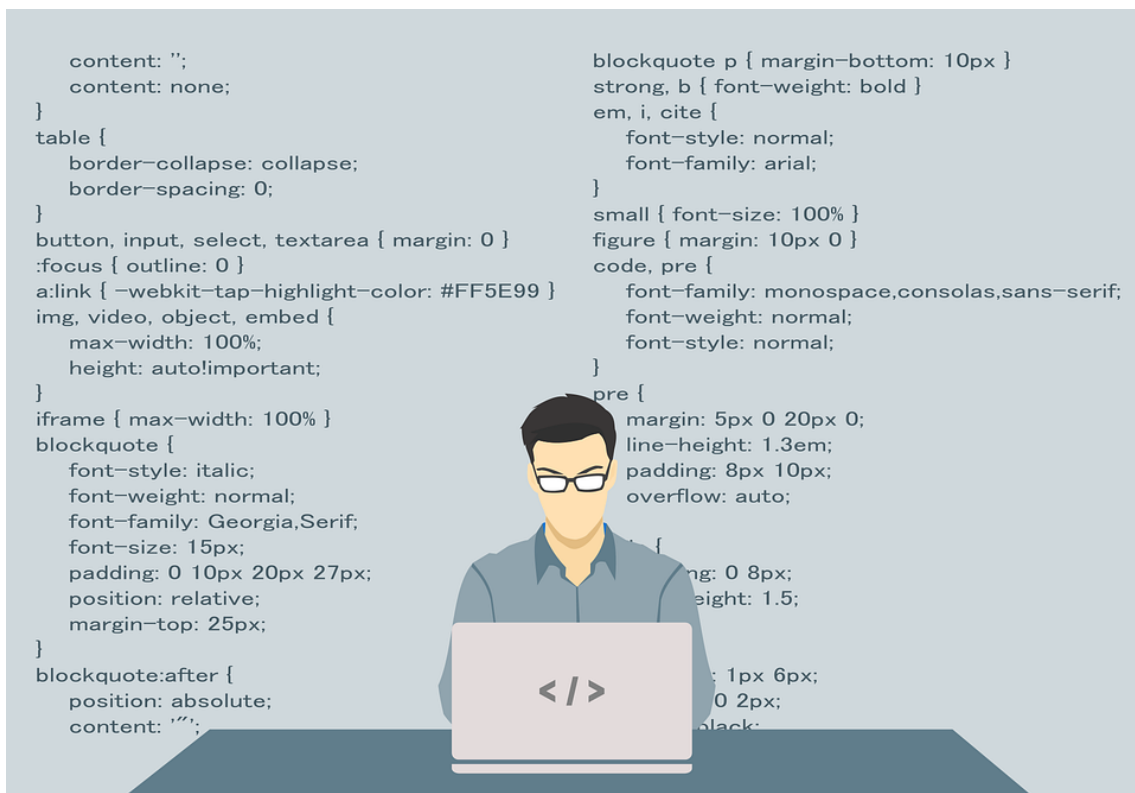
This consistency ensures the code is easy to maintain and any updates or changes can be made quickly and efficiently.

Additionally, front-end frameworks are designed to be responsive, meaning the application will work well on different devices and screen sizes. Hence, providing a better user experience.

1.2.4 Why Use Frontend Frameworks?

You must know the front-end frameworks determine every element's behaviour, design, logic, structure, and animation. Here are some reasons showing the importance of front-end development frameworks.

- Accelerated Development Speed
- Front-end frameworks offer pre-built components and libraries, accelerating development speed by reducing manual coding efforts.
- Low Code
- With front-end frameworks, developers can build applications with minimal coding as the frameworks offer pre-designed UI components.
- Easy Maintenance
- Since front-end frameworks use standardized coding practices, it becomes easier to maintain and update the codebase, leading to reduced maintenance efforts.
- Two-Way Data Binding
- Two-way data binding in front-end frameworks allows for seamless communication between the model and view, reducing the need for manual updates.



1.2.5 What Are the Benefits of the Front-End Framework?

Here are some benefits that every developer must know before using the front-end development framework.

- **Responsive Features and Applications**
Front-end frameworks provide a wide range of responsive design elements and tools. Moreover, they allow developers to create websites and applications that automatically adjust to different screen sizes and devices.
- **Cross Browser Support**
Front-end frameworks offer cross-browser compatibility. Web applications built using these frameworks work seamlessly across different browsers. It also prevents glitches or errors.
- **User Driven Outcomes**
Front-end frameworks focus on user-centric design principles. Hence, offering a range of pre-built UI components and templates that improve user experience. Moreover, it also helps developers create user-friendly applications quickly and efficiently.

1.2.6 What Factors to Consider When Selecting the Best Front-End Framework?

When selecting the best front-end frameworks for your development projects, you must consider some factors.

- **Core Features**
When selecting a front-end framework, it's essential to consider if it has all the core features required for your desktop-based javascript applications.
- **Popularity**
A popular frontend framework can have a vast community and easy-to-find resources, and the chances of finding experienced developers are high.
- **Usability**
The framework must have a simple and easy-to-use interface for a web application. Hence, allowing developers to write efficient code and deliver fast results.
- **Ease of Integration**
It's crucial to consider how easily the framework can integrate with other tools, such as libraries and plugins.
- **Mobile Development Support**
If you plan to develop a mobile application, consider whether the framework supports mobile development and is optimized for mobile devices.
- **Rendering on the Server**

Server-side rendering can improve website performance and SEO. Consider if the framework allows server-side rendering.

- **Future Support**

Ensure the framework has long-term support and is regularly updated to avoid security issues, compatibility issues, and other bugs.

- **Flexibility**

The framework should be flexible enough to adapt to your project's changing needs without requiring significant changes to the codebase.

1.2.7 Frontend frameworks offer several advantages when it comes to building responsive websites. Here are some key benefits:

- **Consistent and Efficient Development:** Frontend frameworks provide a set of pre-designed components, templates, and utilities that can be readily used to build responsive websites. These frameworks offer a standardized structure and coding patterns, enabling developers to work more efficiently and consistently. They provide a solid foundation for building responsive layouts and handling common responsive design challenges.
- **Responsive Grid Systems:** Many frontend frameworks, such as Bootstrap and Foundation, include responsive grid systems. These grid systems simplify the process of creating responsive layouts by providing a flexible grid structure that automatically adjusts and stacks content based on different screen sizes. Grid systems make it easier to create responsive designs without having to write custom CSS code from scratch.
- **Cross-Browser Compatibility:** Frontend frameworks are designed to work across different web browsers, ensuring consistent behavior and appearance on various platforms. They handle browser compatibility issues, such as CSS resets and normalizations, so developers can focus more on building responsive designs without worrying about inconsistencies or browser-specific quirks.
- **Responsive Components and UI Elements:** Frontend frameworks offer a wide range of pre-built responsive components and UI elements, such as navigation menus, forms, carousels, modals, and more. These components are designed and tested to be mobile-friendly and adaptable to different screen sizes. Using these components saves development time and effort, as they come with responsive behavior built-in.
- **Community and Documentation:** Popular frontend frameworks have large and active communities of developers. This means there are extensive documentation, tutorials, forums, and resources available to help developers learn and troubleshoot. The community support can be invaluable when working on responsive websites, as developers can find solutions to common responsive design challenges, access code snippets, and learn best practices.

- **Mobile-First Approach:** Many frontend frameworks encourage a mobile-first approach to responsive design. This approach involves designing and developing for mobile devices first and then progressively enhancing the experience for larger screens. The mobile-first design focuses on optimizing performance, reducing unnecessary content, and prioritizing key features, resulting in better user experiences across all devices.
- **Rapid Prototyping:** Frontend frameworks facilitate rapid prototyping, allowing developers to quickly create responsive website prototypes or mockups. With pre-designed components and responsive grids, developers can easily experiment with different layouts and designs, iterate quickly, and gather feedback from stakeholders or clients early in the development process.

In summary, frontend frameworks provide a range of advantages for building responsive websites, including streamlined development, responsive grid systems, cross-browser compatibility, ready-to-use responsive components, a supportive community, and the ability to rapidly prototype and iterate designs. These benefits help developers create responsive websites more efficiently and consistently while improving the user experience across different devices.

Self-Check Sheet 1: Interpret responsive website

Short Question

1 What Is a Front-End Framework?

Answer:

2 Why Use a Front-End Framework?

Answer:

3 What Is Ext JS?

Answer:

4 What Are the Most Popular Front-End Frameworks for Web Development in 2023?

Answer:

5 What Are the Benefits of Using a Front-End Framework for Web Development in 2023?

Answer:

6 What are the key advantages of using frontend frameworks in responsive website development?

Answer:

7 How do frontend frameworks handle cross-browser compatibility issues?

Answer:

8 Explain the concept of a responsive grid system and its role in building responsive layouts.

Answer:

9 What does it mean to follow a mobile-first approach in responsive design?

Answer:

10 How can frontend frameworks help with rapid prototyping and iterative design?

Answer:

Answer Key 1- Interpret responsive website

- 1 What Is a Front-End Framework?
Answer: A frontend framework is a collection of pre-written code and tools to simplify and speed up building a user interface.
- 2 Why Use a Front-End Framework?
Answer: A front-end framework can save time, improve efficiency, provide consistency, and offer a range of advanced features.
- 3 What Is Ext JS?
Answer: Ext JS is a JavaScript web framework that helps create modern, scalable, and feature-rich web applications with robust data handling capabilities.
- 4 What Are the Most Popular Front-End Frameworks for Web Development in 2023?
Answer: The most popular & best front-end frameworks for front-end developers in 2023 will likely be Sencha Ext JS, React, Angular, Vue, and Svelte. These top front-end frameworks can provide a complete dynamic solution to create sustainable web applications.
- 5 What Are the Benefits of Using a Front-End Framework for Web Development in 2023?
Answer: The benefits of using a front-end framework for web development in 2023 include faster development, easier maintenance, better scalability, and improved user experience.
- 6 What are the key advantages of using frontend frameworks in responsive website development?
Answer: The key advantages of using frontend frameworks in responsive website development include efficient development, standardized components, simplified cross-browser compatibility, community support, and rapid prototyping capabilities.
- 7 How do frontend frameworks handle cross-browser compatibility issues?
Answer: Frontend frameworks handle cross-browser compatibility issues by providing.
- 8 Explain the concept of a responsive grid system and its role in building responsive layouts.
Answer: A responsive grid system is a set of pre-defined CSS classes that allow developers to create responsive layouts using a grid structure. It helps in organizing and aligning content within a webpage, adapting it to different screen sizes and orientations.
- 9 What does it mean to follow a mobile-first approach in responsive design?
Answer: Following a mobile-first approach means designing and developing for mobile devices first and then progressively enhancing the design for larger screens. This approach focuses on prioritizing content and optimizing performance for smaller devices, ensuring a better user experience on mobile.
- 10 How can frontend frameworks help with rapid prototyping and iterative design?
Answer: Frontend frameworks provide pre-built components, templates, and utilities that enable rapid prototyping. Developers can quickly assemble and customize these components to create responsive website prototypes, allowing for iterative design and faster feedback loops during the development process.

Learning Outcome 2: Interpret front-end framework components

Assessment Criteria	<ol style="list-style-type: none"> 1. Bootstrap Front-end framework is selected 2. Bootstrap documentation is interpreted 3. Fundamentals of Bootstrap is interpreted. 4. Bootstrap is integrated.
Conditions and Resources	<ol style="list-style-type: none"> 1. Applicable tools, utensils, and equipment as prescribed by competency standards. 2. Supply materials 3. Relevant ingredients 4. CBLM related to the learning outcome. 5. Instructions, job sheets, activity sheets, and standard operating procedures 6. Personal protective equipment
Contents	<ol style="list-style-type: none"> 1. Bootstrap Front-end Framework 2. Bootstrap Documentation 3. Fundamentals of Bootstrap 4. Bootstrap into Web Projects
Learning Materials	<ol style="list-style-type: none"> 1. CBLM 2. Handouts 3. Books, Manuals 4. Module/ Reference 5. Paper 6. Pen
Training Methods	<ol style="list-style-type: none"> 1. Discussion 2. Presentation 3. Demonstration 4. Guided Practice 5. Individual Practice 6. Project Work 7. Problem Solving 8. Brainstorming
Assessment Methods	<ol style="list-style-type: none"> 1. Written Test 2. Demonstration 3. Oral Questioning

Learning Experience 2: Interpret front-end framework components

You must perform the learning steps below to achieve the objectives stated in this learning guide. Beside each step are the resources or special instructions you will use to accomplish the corresponding activity.

Learning Steps	Resources specific instructions
1. Students will ask the instructor about work with front-end framework	1. The instructor will provide the learning materials for interpret front-end framework components
2. Read the Information sheet/s	2. Information Sheet No: 2 Interpret front-end framework components
3. Complete the Self-Checks & Answer key sheets.	3. Self-Check No: 2- Interpret front-end framework components Answer key No. 2- Interpret front-end framework components
4. Read the Job/ Task sheet and Specification Sheet	4. Job/ task sheet and specification sheet Job Sheet No: 2 Integrate bootstrap Specification Sheet: 2 Integrate bootstrap

Information Sheet 2: Interpret front-end framework components

Learning Objective:

After completion of this information sheet, the learners will be able to explain, define and interpret the following contents:

- 2.1 Bootstrap Front-end Framework
- 2.2 Bootstrap Documentation
- 2.3 Fundamentals of Bootstrap
- 2.4 Bootstrap into Web Projects

2.1 Selecting the Bootstrap Front-end Framework

When selecting a front-end framework, Bootstrap is a popular and versatile choice that provides a solid foundation for building responsive and mobile-first websites. Here are some factors to consider when selecting Bootstrap as your front-end framework:

- **Documentation and Community:** Bootstrap has excellent documentation, including guides, examples, and a comprehensive list of components and utilities. It also has a large and active community, which means you can find support, tutorials, and additional resources easily.
- **Customization:** Bootstrap offers extensive customization options. You can choose to include the entire framework or only select components, making it adaptable to your project's specific needs. You can also use Bootstrap's customization tool to modify the default styles and design.
- **Responsive Design:** One of the main advantages of Bootstrap is its built-in support for responsive web design. It provides a responsive grid system and responsive utility classes that help create layouts that adapt to different screen sizes and devices.
- **Component Library:** Bootstrap comes with a wide range of pre-built components, such as navigation bars, buttons, forms, modals, and carousels. These components can save development time and ensure consistency across your website.
- **Browser Compatibility:** Bootstrap is designed to work well across different browsers, ensuring a consistent user experience. It includes built-in polyfills for older browsers and focuses on compatibility with popular browsers, making it a reliable choice.
- **Third-Party Integration:** Bootstrap plays well with other tools and libraries, allowing you to easily integrate it with JavaScript frameworks like React or Angular. There are also numerous third-party plugins and extensions available for extending Bootstrap's functionality.
- **Performance:** Bootstrap is optimized for performance, with a focus on lightweight CSS and JavaScript. However, keep in mind that including the entire framework can result in larger file sizes, so consider selectively including only the components you need to minimize the impact on performance.

- **Learning Curve:** While Bootstrap is relatively easy to get started with, it does have a learning curve, especially if you want to take full advantage of its customization options and advanced features. Familiarity with HTML, CSS, and JavaScript is recommended.

Ultimately, the choice of a front-end framework depends on your project requirements, familiarity with the technology stack, and personal preferences. Bootstrap is widely used and offers a robust set of features, making it a reliable choice for many web development projects.

2.1.1 Bootstrap

Bootstrap is a popular open-source front-end framework developed by Twitter. It provides a collection of pre-built HTML, CSS, and JavaScript components and a responsive grid system that helps developers quickly create modern and mobile-friendly websites and web applications.



Here are some reasons why you might choose to use Bootstrap:

- **Responsive Design:** One of the main benefits of using Bootstrap is its built-in support for responsive web design. It includes a responsive grid system that allows you to create flexible layouts that automatically adjust to different screen sizes and devices. This saves time and effort in building separate versions of your site for desktop and mobile devices.
- **Time Efficiency:** Bootstrap offers a comprehensive set of ready-to-use components, such as navigation bars, buttons, forms, modals, and more. These components are well-tested and provide consistent styling and behavior across different browsers. By leveraging these pre-built components, you can save development time and focus on customizing them to suit your specific needs.
- **Time Efficiency:** Bootstrap offers a comprehensive set of ready-to-use components, such as navigation bars, buttons, forms, modals, and more. These components are well-tested and provide consistent styling and behavior across different browsers. By leveraging these pre-built components, you can save development time and focus on customizing them to suit your specific needs.
- **Consistency and Cross-Browser Compatibility:** Bootstrap provides a consistent and unified look and feel across different browsers and devices. It takes care of handling browser compatibility issues and provides built-in CSS resets and JavaScript polyfills for older browsers. This ensures that your website looks and functions consistently for all users.

- **Customization Options:** While Bootstrap comes with a default set of styles, it also offers extensive customization options. You can use Bootstrap's customization tool to select specific components, modify the default colors, typography, and other design elements to match your project's branding. This flexibility allows you to create unique designs while still leveraging Bootstrap's underlying structure and functionality.
- **Community and Support:** Bootstrap has a large and active community of developers. This means you can find plenty of resources, tutorials, and documentation to help you get started and solve any issues you encounter. The community also contributes additional themes, templates, and plugins that extend Bootstrap's functionality and offer further customization options.
- **Mobile-First Approach:** Bootstrap follows a mobile-first approach, meaning that it prioritizes the design and development of websites for mobile devices. This approach ensures that your website is optimized for mobile users, who make up a significant portion of internet traffic. By using Bootstrap, you can easily create responsive and mobile-friendly designs without the need for extensive coding.
- **Integration with JavaScript Frameworks:** Bootstrap can be easily integrated with popular JavaScript frameworks such as React, Angular, and Vue.js. This allows you to combine the benefits of both frameworks and build dynamic and interactive web applications.

In summary, Bootstrap provides a range of benefits, including responsive design, time efficiency, consistency, cross-browser compatibility, customization options, community support, and integration with JavaScript frameworks. These advantages make it a popular choice for developers looking to create modern, mobile-first websites and web applications.

2.1.2 Zurb Foundation

Zurb Foundation is another popular open-source front-end framework that helps developers build responsive and accessible websites and web applications. Here's an overview of Zurb Foundation and its benefits:



- **Responsive Grid System:** Zurb Foundation offers a responsive grid system that allows you to create flexible and responsive layouts. It provides a mobile-first approach, enabling you to design for smaller screens and progressively enhance for larger screens. The grid system is easy to use and allows for creating complex layouts with ease.
- **Modular Approach:** Foundation follows a modular approach, where you can select and include only the specific components you need. This helps in keeping the overall file size smaller and improves performance. It offers a wide range of components like navigation menus, buttons, forms, modals, and more, making it flexible and customizable.

- **Customization Options:** Foundation provides a customizable framework. You can utilize the Sass-based styling system to modify and extend the default styles according to your project's requirements. This allows for consistent branding and design across your application.
- **Accessibility:** Zurb Foundation has a strong focus on accessibility. It includes built-in accessibility features, semantic HTML markup, and follows best practices to ensure that your website or application is accessible to all users, including those with disabilities.
- **Browser Compatibility:** Foundation is designed to work across different browsers, ensuring consistent rendering and functionality. It includes built-in support for modern browsers and provides graceful degradation for older browsers, ensuring a good user experience for all visitors.
- **Extensive Documentation:** Zurb Foundation has comprehensive documentation that includes guides, examples, and API references. The documentation makes it easier for developers to get started with the framework, learn its features, and troubleshoot any issues they may encounter during development.
- **Community and Support:** Foundation has an active community of developers who contribute to the framework and provide support through forums and online communities. The community-driven nature of Foundation ensures that you can find help, resources, and additional add-ons to enhance your development process.
- **Integration with JavaScript Frameworks:** Zurb Foundation can be integrated with popular JavaScript frameworks like React, Angular, and Vue.js. This allows you to leverage the benefits of both Foundation and your chosen JavaScript framework to build dynamic and interactive web applications.

When considering Zurb Foundation as your front-end framework, it's important to assess your project requirements, design preferences, and development expertise. Both Zurb Foundation and Bootstrap offer powerful features and benefits, so choosing between them depends on your specific needs and familiarity with the framework.

2.1.3 Meteor

Meteor is a full-stack JavaScript platform that simplifies the process of building web and mobile applications. It combines a front-end framework, a back-end framework, and a real-time database to provide a seamless development experience. Here's an overview of Meteor and its key features:



- **Full-Stack JavaScript:** Meteor allows you to write both the front-end and back-end code in JavaScript. This means you can use a single language throughout your entire application, which can streamline development and make it easier to share code between client and server.

- **Reactive Data:** Meteor is built on the concept of reactivity, where data changes are automatically propagated to all connected clients in real-time. This enables the creation of dynamic and interactive applications without the need for manual data synchronization.
- **Data on the Wire:** Meteor follows a "Data on the Wire" principle, where the server sends data, not HTML, to the client. This approach minimizes the amount of data transferred over the network, resulting in faster application performance and a smoother user experience.
- **Live Reload:** Meteor provides live reloading, which means that any changes you make to your code are immediately reflected in the running application without requiring a manual page refresh. This accelerates the development workflow and allows for rapid iteration.
- **Database Integration:** Meteor integrates with MongoDB, a popular NoSQL database, out of the box. It provides a simple API for working with data on the client and server, including features like data synchronization, optimistic UI, and real-time updates.
- **Package Ecosystem:** Meteor has a rich ecosystem of community-contributed packages that extend its functionality. These packages cover various areas such as authentication, file uploads, routing, UI components, and more. Leveraging these packages can help speed up development and add desired features to your application.
- **Cross-Platform Development:** With Meteor, you can build both web and mobile applications using a single codebase. It provides native integration with Cordova (formerly PhoneGap), allowing you to package your web app as a mobile app for iOS and Android.
- **Meteor Galaxy:** Meteor offers a hosting platform called Meteor Galaxy, specifically designed for deploying and managing Meteor applications. Galaxy provides features like automatic scaling, SSL support, and application performance monitoring, simplifying the deployment process.

Meteor is a powerful choice for developers who prefer a JavaScript-centric approach and want to quickly build real-time, reactive applications. However, it's worth considering your specific project requirements, the scalability needs, and your team's familiarity with the JavaScript ecosystem before deciding to use Meteor.

2.1.4 Ionic

Ionic is an open-source framework for building cross-platform mobile applications using web technologies such as HTML, CSS, and JavaScript. It combines the power of Angular (a popular JavaScript framework), HTML5, and CSS to create high-performance, native-like mobile applications. Here are some key features of Ionic:



- **Cross-Platform Development:** Ionic allows you to develop mobile applications that can run on multiple platforms, including iOS, Android, and the web, using a single codebase. This saves time and effort by eliminating the need to develop and maintain separate codebases for each platform.
- **UI Components:** Ionic provides a library of pre-built UI components that are designed to look and feel like native mobile elements. These components include navigation menus, buttons, forms, lists, modals, and more. They offer a consistent and polished user interface across different platforms.
- **Theming and Customization:** Ionic comes with a powerful theming system that allows you to easily customize the appearance of your application. You can choose from predefined themes or create your own custom themes to match your branding and design requirements.
- **Cordova Plugins:** Ionic integrates seamlessly with Apache Cordova (formerly PhoneGap), which provides access to native device features and capabilities. Cordova plugins enable you to access functionalities like camera, geolocation, push notifications, and more, making it easier to build feature-rich mobile applications.
- **Performance Optimization:** Ionic uses hardware-accelerated animations and optimized scrolling to deliver smooth and responsive user experiences. It also leverages the power of modern web technologies, like lazy loading and Ahead-of-Time (AOT) compilation, to optimize application performance and reduce load times.
- **Ionic Capacitor:** In addition to Cordova, Ionic introduced Capacitor, a native runtime that offers a modern alternative for accessing native device features. Capacitor provides a flexible and extensible plugin system and supports multiple frameworks, including Ionic, React, and Angular.
- **Progressive Web Apps (PWA):** Ionic allows you to build Progressive Web Apps that can be installed and run on any modern web browser, providing an app-like experience. This enables you to reach a wider audience beyond traditional mobile platforms.
- **Community and Ecosystem:** Ionic has a large and active community of developers. It offers extensive documentation, tutorials, and a marketplace for plugins, themes, and starter templates. The vibrant community ensures that you can find support, resources, and guidance throughout your development journey.

Ionic is an excellent choice for developers familiar with web technologies who want to create mobile applications that work across multiple platforms. It provides a balance between performance, flexibility, and ease of development, making it a popular framework for building hybrid and progressive web applications.

2.1.5 Materialize

Materialize is a modern front-end framework that follows the principles of Material Design, a design language developed by Google. It provides a set of



pre-designed and responsive UI components, CSS styles, and JavaScript functionality to build visually appealing and user-friendly websites and web applications. Here are the key features of Materialize:

- **Material Design:** Materialize adheres to the principles of Material Design, which focuses on creating a clean and intuitive user interface. It employs elements like depth, shadows, and vibrant colors to provide a visually appealing and engaging user experience.
- **Responsive Design:** Materialize is built with responsiveness in mind. It includes a responsive grid system that allows you to create flexible layouts that adapt to different screen sizes and devices. This ensures that your website looks great on desktops, tablets, and smartphones.
- **Ready-to-Use Components:** Materialize offers a comprehensive collection of UI components that are designed to be aesthetically pleasing and easy to use. These components include navigation bars, buttons, cards, modals, forms, and more. By leveraging these pre-built components, you can save development time and ensure a consistent design throughout your application.
- **CSS Transitions and Animations:** Materialize provides CSS transitions and animations that can be easily applied to elements. These animations add a touch of interactivity and smoothness to your user interface, enhancing the overall user experience.
- **Customization Options:** Materialize allows you to customize the framework to match your project's branding and design requirements. You can utilize Sass variables and mixins to modify colors, typography, spacing, and other stylistic aspects. This enables you to create a unique and cohesive design for your application.
- **JavaScript Functionality:** Materialize includes JavaScript components and plugins that enhance the functionality of your website. Examples include dropdowns, collapsible sections, sliders, date pickers, and more. These components are easy to integrate and provide interactivity to your application.
- **Documentation and Community:** Materialize has well-documented and user-friendly documentation that provides guidance on how to use the framework effectively. It also has an active community where you can find support, share ideas, and access additional resources.
- **Integration with JavaScript Frameworks:** Materialize can be easily integrated with popular JavaScript frameworks like React, Angular, and Vue.js. This allows you to combine the benefits of Materialize's design system with the power and flexibility of these frameworks.

Materialize offers a visually appealing and intuitive design system that can help you create modern and responsive websites and web applications. It's a suitable choice for developers who want to leverage Material Design principles and pre-built components to streamline their development process and provide a visually pleasing user experience.

2.2 Interpreting Bootstrap Documentation

Interpreting the Bootstrap documentation is crucial for effectively using the framework and understanding its features and capabilities. Here are some key tips to help you navigate and make the most of the Bootstrap documentation:

- **Familiarize Yourself with the Structure:** Start by getting familiar with the structure of the Bootstrap documentation. The documentation is divided into sections such as Getting Started, Components, Layout, Utilities, and more. Each section focuses on a specific aspect of the framework.
- **Read the Introduction and Getting Started:** Begin by reading the introductory sections to understand the core concepts and principles of Bootstrap. The Getting Started guide provides instructions on how to set up and include Bootstrap in your project.
- **Understand the Components:** The Components section is one of the most important parts of the documentation. It covers the various pre-built UI components offered by Bootstrap, such as navigation bars, buttons, forms, modals, and more. Each component has its own dedicated documentation page that provides details about its usage, options, and examples.
- **Explore the Examples and Code Snippets:** The Bootstrap documentation provides numerous examples and code snippets to demonstrate how to use the framework effectively. Take the time to explore these examples and analyze the code to understand how the components and features work together.
- **Pay Attention to CSS Classes and Markup:** Bootstrap relies heavily on CSS classes and specific markup patterns to apply styles and functionality. Understanding these class names and markup patterns is crucial for effectively utilizing the framework. Refer to the documentation for each component to see the available classes and how they can be used.
- **Check for Options and Configurations:** Many Bootstrap components offer various options and configurations that allow you to customize their behavior and appearance. Pay attention to these options and their documentation to make the most out of the components.
- **Use the Search Functionality:** The Bootstrap documentation provides a search bar that allows you to quickly find specific components, classes, or topics. If you have a specific query or need to find information on a particular feature, use the search functionality to navigate directly to the relevant section.
- **Explore Advanced Features:** In addition to the core components, Bootstrap offers advanced features like the grid system, responsive utilities, JavaScript plugins, and customization options. Take the time to explore these features and read their respective documentation to leverage the full power of Bootstrap.

Remember, the Bootstrap documentation is comprehensive and may seem overwhelming at first. Take it step by step, refer back to the documentation whenever needed, and experiment with the examples provided to gain a better understanding of how to use Bootstrap effectively in your projects.

2.3 The Fundamentals of Bootstrap

Bootstrap

Bootstrap is a popular open-source frontend framework that provides a collection of CSS styles, JavaScript components, and responsive grid layouts to simplify and accelerate web development. Here are the key fundamentals of Bootstrap:

- **Responsive Grid System:** Bootstrap's grid system is a fundamental feature that helps create responsive layouts. It is based on a 12-column grid, allowing developers to divide the web page content into rows and columns. The grid automatically adjusts the layout and column stacking based on the device screen size, ensuring a responsive design across various devices.
- **CSS Styles and Components:** Bootstrap includes a comprehensive set of CSS classes and styles that can be applied to HTML elements. These styles provide consistent typography, buttons, forms, alerts, navigation menus, and other UI components. By utilizing the predefined classes, developers can easily style and customize the appearance of their web pages.
- **JavaScript Components and Plugins:** Bootstrap offers a wide range of JavaScript components and plugins that enhance the functionality and interactivity of websites. These components include modals, carousels, dropdowns, tooltips, tabs, accordions, and more. By incorporating these components, developers can add advanced features to their websites without having to write complex JavaScript code from scratch.
- **Customizable Themes:** Bootstrap allows developers to customize the look and feel of their websites using themes. It provides a default theme, but developers can easily modify variables and styles to create their own custom themes. This feature enables consistent branding and visual coherence across the website.
- **Cross-Browser Compatibility:** Bootstrap is designed to work seamlessly across different web browsers, ensuring consistent rendering and behavior. It takes care of browser compatibility issues by providing CSS resets and utilizing modern web standards. This allows developers to build websites that function correctly on major browsers without needing extensive testing and adjustments.
- **Documentation and Community:** Bootstrap offers thorough and well-organized documentation that guides developers through the framework's features and usage. The documentation includes examples, code snippets, and explanations, making it easier for developers to understand and implement Bootstrap in their projects. Additionally, Bootstrap has a large community of developers who actively contribute, provide support, and share resources, which further enhances the learning experience.
- **Mobile-First Approach:** Bootstrap follows a mobile-first approach to responsive design. This means that the framework prioritizes designing and optimizing for mobile devices first and then progressively enhances the experience for larger screens. The default CSS styles and components in Bootstrap are optimized for mobile devices, ensuring a smooth and user-friendly experience on smartphones and tablets.

- By understanding and utilizing these fundamental aspects of Bootstrap, developers can leverage the framework's features, reduce development time, and create responsive and visually appealing websites with ease.

2.3.1 Why should I use Bootstrap?

Bootstrap offers a collection of CSS classes "out of the box" that allow developers to quickly create pages that scale to screens of different sizes. Developers can also decorate common UI components such as dialog boxes, buttons, forms, and tables with these classes.

Bootstrap supports the latest, stable releases of all major browsers and platforms

Getting Started

We start with a skeleton HTML page. Nothing fancy here.

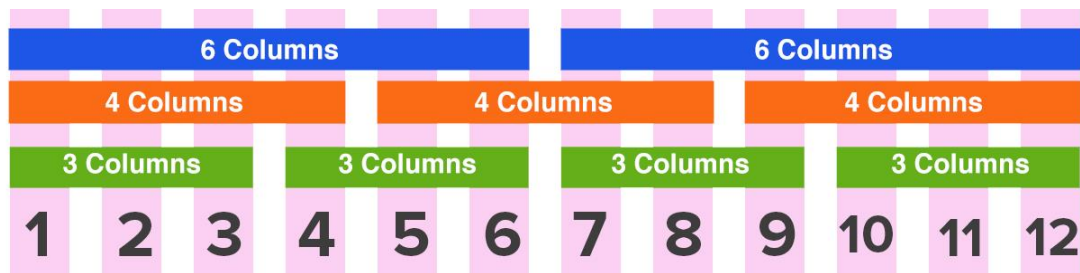
```
<!DOCTYPE html>
<html lang="en">
  <head>
    <meta charset="utf-8">
    <meta http-equiv="X-UA-Compatible" content="IE=edge">
    <meta name="viewport" content="width=device-width, initial-
scale=1">
    <title>Bootstrap Demo</title>
  </head>
  <body></body>
</html>
```

We then add the current stable version of Bootstrap CSS inside our <head> element on line 11:

```
<!DOCTYPE html>
<html lang="en">
  <head>
    <meta charset="utf-8">
    <meta http-equiv="X-UA-Compatible" content="IE=edge">
    <meta name="viewport" content="width=device-width, initial-
scale=1">
    <title>Bootstrap Demo</title>
    <!-- Bootstrap CSS -->
    <link
href="https://maxcdn.bootstrapcdn.com/bootstrap/3.3.7/css/bootstrap
.min.css" rel="stylesheet">
  </head>
  <body></body>
</html>
```

2.3.2 The Grid System

Bootstrap layouts are based on a 12-column grid. We use CSS classes to specify the width of each element. Each HTML element may take up to 12 columns of space.



Grid classes are based on screen size:

- xs = Less than 768 pixels
- sm = 768-991 pixels
- md = 992-1199 pixels
- lg = Greater than or equal to 1200 pixels

Suppose we want our page layout to consist of a main content area that takes up most of the page width but also include room for a sidebar on the left.

We can use the provided CSS classes to accomplish this:

```
<div id="side-bar" class="col-md-2">
  <ul>
    <li>Sidebar item 1</li>
    <li>Sidebar item 2</li>
    <li>Sidebar item 3</li>
  </ul>
</div>
<div id="main-content" class="col-md-10">
  <p>Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor
  incididunt ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis nostrud
  exercitation ullamco laboris nisi ut aliquip ex ea commodo consequat.</p>
</div>
```

We specify 2 columns for the sidebar and 10 columns for the content area. We want these values to add up to 12 because the grid system is 12 columns.

Grid classes apply to screen size we specify and larger. So when we apply the col-md-2 class to the sidebar element, it will take up 2 columns on medium and large screens.

Containers and Rows

A container is a class that defines the page size based on the viewport width. This is typically applied to one div element which contains the entire contents of the page.

Rows may be placed within a .container (fixed-width) or .container-fluid (full-width) for proper alignment and padding.

Use rows (.row) to create horizontal groups of columns.

```
<body>
  <div class="container">
    <div class="row">Row 1</div>
    <div class="row">Row 2</div>
  </div>
</body>
```

Toggle Element Visibility

We can use the hidden-xx or visible-xx classes to toggle visibility of elements based on screen size:

Hide sidebar on small screens

```
<div id="side-bar" class="col-md-2 hidden-sm">
```

Show logo on large screens

```

```

Glyphicons

These are icons bundled with Bootstrap that can be added to the page using a span element. A list of available glyphicons can be found [here](#). We can insert these icons anywhere we would normally put in a span not just buttons (table headings, paragraphs, lists, etc).

We could make a download button more visually appealing with a glyphicon:

```
<button class="btn btn-lg btn-
primary">
  <span class="glyphicon
glyphicon-download-
alt"></span> Download
</button>
```



Customization

A common criticism of Bootstrap is that all sites end up looking the same. However, it is easy to customize the styles shipped with Bootstrap so we can have a unique look that conforms to company branding.

CHANGE DEFAULT FONT

Let's say we didn't like the default font-family of Helvetica, Arial, sans-serif and instead wanted to use Roboto from Google Fonts instead. Here's how we could do that:

- Add CSS for Roboto font
`<link href="https://fonts.googleapis.com/css?family=Roboto" rel="stylesheet">`
- Custom stylesheet added after Bootstrap CSS
`body { font-family: 'Roboto', sans-serif; }`

CHANGE BUTTON STYLE

The same process can be used to modify colors, button shapes, and anything else defined in the Bootstrap CSS file.



```
.btn { border-radius: 20px; }
```

```
.btn { border-radius: 0px; }
```



THEMES

We can download themes created by others to skin the look as well.

The Bootstrap project provides a theme that changes the appearance of buttons and other components for a less flat look.

Themes can be added by adding the appropriate CSS file after the Bootstrap CSS.

```
<link  
href="https://maxcdn.bootstrapcdn.com/bootstrap/3.3.7/css/bootstrap  
-theme.min.css" rel="stylesheet">
```



Components

Bootstrap has many other components which I'll be covering in a subsequent article.

2.4 Integrating Bootstrap into Web Projects

Integrating Bootstrap into web projects involves a few steps to get started. Here's a general guide on how to integrate Bootstrap into your web projects:

- **Include Bootstrap Files:** Once downloaded, extract the Bootstrap files and locate the CSS and JavaScript files. Copy the necessary files and place them in your project directory. You typically need to include the Bootstrap CSS file (bootstrap.css or bootstrap.min.css) in the `<head>` section of your HTML file and the Bootstrap JavaScript file (bootstrap.js or bootstrap.min.js) before the closing `</body>` tag.
- **Add Required Dependencies:** Bootstrap requires jQuery, a popular JavaScript library, to work properly. Make sure to include jQuery in your project as well. You can either download jQuery from its official website or include it via a Content Delivery Network (CDN) by adding the following line in the `<head>` section of your HTML file:

```
<script src="https://code.jquery.com/jquery-{version}.min.js"></script>
```

Replace {version} with the desired jQuery version (e.g., 3.6.0).

- **Customize Bootstrap:** If desired, you can customize the Bootstrap framework to match your project's design and branding. Modify the variables and styles in the Bootstrap source files (if you downloaded the Sass version) or create custom CSS rules that override the default Bootstrap styles. This allows you to create a unique visual appearance for your website.
- **Test and Iterate:** After integrating Bootstrap, test your web project across different devices and screen sizes to ensure the responsive behavior is working as expected. Make any necessary adjustments and iterate on the design and functionality based on user feedback or requirements.

Remember to refer to the official Bootstrap documentation for detailed information on specific components, customization options, and best practices. Additionally, the Bootstrap community provides forums, tutorials, and resources that can further assist you in integrating and utilizing Bootstrap effectively in your web projects.

Reason to choose Bootstrap:

- Faster and Easier Web-Development.
- It creates Platform-independent web pages.
- It creates Responsive Web-pages.
- It's designed to be responsive to mobile devices too.
- It's Free! Available on www.getbootstrap.com

Websites that were built with a lot of CSS and JavaScript can now be built with a few lines of code using Bootstrap. Bootstrap comprises of mainly three components:

- CSS
- Fonts

- Javascript

The bootstrap can be used in 2 ways:

- Using Bootstrap CDN Link.
- By downloading the Bootstrap file.

We can easily get the resources for both approaches from the official website. Let's begin the discussion with the first approach.

Method 1: Using CDN links – This method of installing Bootstrap is fairly easy but it requires a stable internet connection. It is highly recommended that you follow this method.

Step 1: Goto getbootstrap and click Getting Started. There you will find the below CDN links.

Step 2: Copy the links & paste it inside the <head> tag.

CSS link:

```
<link href="https://cdn.jsdelivr.net/npm/bootstrap@5.1.1/dist/css/bootstrap.min.css"
      rel="stylesheet" integrity="sha384-
F3w7mX95PdgyTmZZMECAngseQB83DfGTowi0iMjiWaeVhAn4FJkqJByhZMI3AhiU"
      crossorigin="anonymous">
```

JavaScript link:

```
<script src="https://cdn.jsdelivr.net/npm/bootstrap@5.1.1/dist/js/bootstrap.bundle.min.js"
        integrity="sha384-
/bQdsTh/da6pkI1MST/rWKFNjaCP5gBSY4sEBT38Q/9RBh9AH40zEOg7H1q2THRZ"
        crossorigin="anonymous"></script>
```

Step 3: After completing the above steps, the code will be like the following:

```
<!DOCTYPE html>
<html lang="en">
  <head>
    <!-- Required meta tags -->
    <meta charset="utf-8" />
    <meta name="viewport" content=
"width=device-width, initial-scale=1" />
    <!-- Bootstrap CSS -->
    <link href=
```

```

"https://cdn.jsdelivr.net/npm/bootstrap@5.1.1/dist/css/bootstrap.min.css"
    rel="stylesheet" integrity=
        "sha384-
F3w7mX95PdgyTmZZMECAngseQB83DfGTowi0iMjiWaeVhAn4FJkqJByhZMI3AhiU"
    crossorigin="anonymous" />
</head>
<body>
<h1>Hello, world!</h1>
    <div>
        You're learning Bootstrap
        on Geeksforgeeks.org
    </div>
<!-- Optional JavaScript; choose one of the two! -->
    <!-- Option 1: Bootstrap Bundle with Popper -->
        <script src=
            "https://cdn.jsdelivr.net/npm/bootstrap@5.1.1/dist/js/bootstrap.bundle.min.js"
                integrity=
                    "sha384-
/bQdsTh/da6pkI1MST/rWKFNjaCP5gBSY4sEBT38Q/9RBh9AH40zEOg7Hlq2THRZ"
                crossorigin="anonymous">
        </script>
    <!-- Option 2: Separate Popper and Bootstrap JS -->
        <!--
            <script src=
                "https://cdn.jsdelivr.net/npm/@popperjs/core@2.9.3/dist/umd/popper.min.js"
                    integrity=
                        "sha384-
W8fXfP3gkOKtndU4JGtKdVXbO53Wy8SZCQHczT5FMiiqmQfUpWbYdTil/SxwZgAN"
                    crossorigin="anonymous">
            </script>
        <script src=

```

```

"https://cdn.jsdelivr.net/npm/bootstrap@5.1.1/dist/js/bootstrap.min.js"
    integrity=
    "sha384-
skAcpIdS7UcVUC05LJ9Dxay8AXcDYfBJqt1CJ85S/CFujBsIzCIv+19liuYLaMQ/"
    crossorigin="anonymous">
</script> -->
</body>
</html>

```

At this stage, we have completed the installation process & we can now start to implement the logic.

Example: This example illustrates the use of the Bootstrap CDN link, in order to use the Bootstrap with the HTML document.

```

<!DOCTYPE html>
<html lang="en">
  <head>
    <!-- Required meta tags -->
    <meta charset="utf-8" />
    <meta name="viewport"
content="width=device-width,
    initial-scale=1" />

    <!-- Bootstrap CSS -->
    <link href=
"https://cdn.jsdelivr.net/npm/bootstrap@5.1.1/dist/css/bootstrap.min.css"
    rel="stylesheet"
    integrity=
    "sha384-
F3w7mX95PdgyTmZZMECAngseQB83DfGTowi0iMjiWaeVhAn4FJkqJByhZMI3AhiU"
    crossorigin="anonymous"/>
    <title>Welcome to GeeksforGeeks</title>
  </head>
  <body>

```

```
<h1>GeeksforGeeks</h1>
```

```
<h3>Bootstrap Button</h3>
```

```
<hr />
```

```
<button type="button"  
class="btn btn-primary">Primary  
</button>
```

```
<button type="button"  
class="btn btn-secondary">Secondary  
</button>
```

```
<button type="button"  
class="btn btn-success">Success  
</button>
```

```
<button type="button"  
class="btn btn-danger">Danger  
</button>
```

```
<button type="button"  
class="btn btn-warning">Warning  
</button>
```

```
<button type="button"  
class="btn btn-info">Info  
</button>
```

```
<button type="button"  
class="btn btn-light">Light  
</button>
```

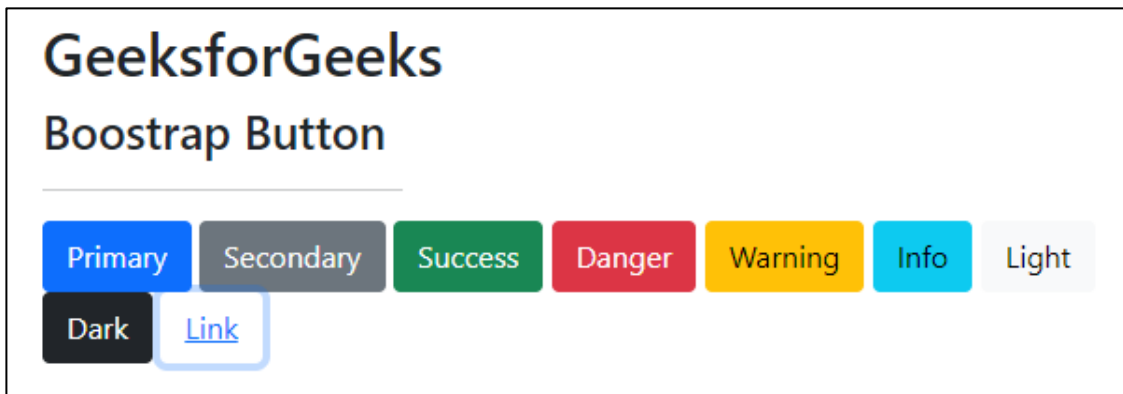
```
<button type="button"  
class="btn btn-dark">Dark  
</button>
```

```
<button type="button"  
class="btn btn-link">Link  
</button>
```

```
</body>
```

```
</html>
```

Output:

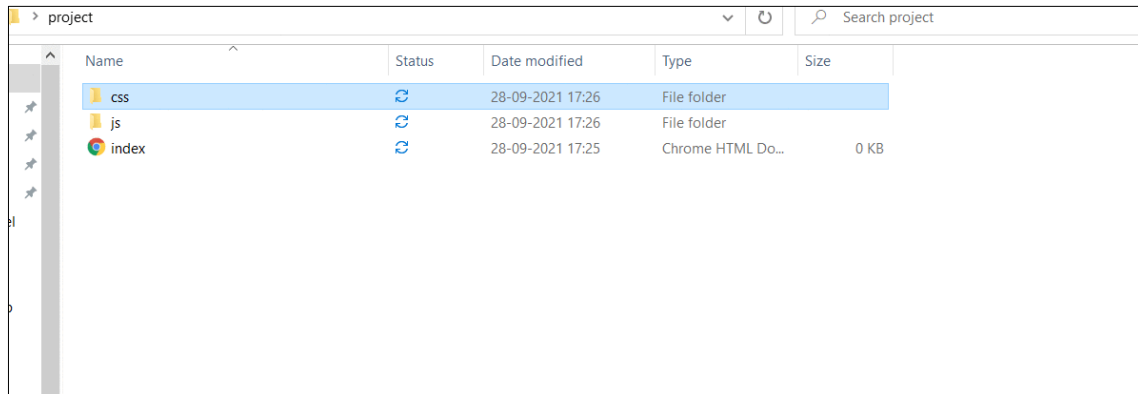


Method 2: By downloading Bootstrap – This method of installing bootstrap is also easy but it can work offline (doesn't require an internet connection) but it might not work for some browsers.

Step 1: Goto getbootstrap and click Getting Started. Click on the Download Bootstrap button and download the compiled CSS and JS.

Step 2: A .zip file would get downloaded. Extract it and go into the distribution folder. You would see 2 folders named CSS and JS. You can make your HTML file there and then you must paste these links in their respective sections. Under CSS files the most important files to be used are bootstrap and bootstrap.min. Under JS files, the most important are bootstrap.min.js and bootstrap.js.

Step 3: Make a separate project folder and create an HTML file. Under the folder, copy the extracted files downloaded from bootstrap. Under the head tag of the HTML file, the CSS needs to be linked. The jQuery downloaded should also be copied under the JS file. Make sure that under the project file, the downloaded files and HTML page must be present in that folder.



Step 4: After completing the above steps, the final code will look like the following code example. The final code after saving files under the same folder and adding links under the head and body tag respectively.

```

<!DOCTYPE html>
<html lang="en">

<head>
  <!-- Required meta tags -->
  <meta charset="utf-8" />
  <meta name="viewport"
    content="width=device-width,
    initial-scale=1" />

  <link rel="stylesheet"
    type="text/css"
    href="css/bootstrap.css" />
</head>

<body>
  <h1>Welcome to gfg</h1>
  <script type="text/javascript"
    href="js/jquery.js">
  </script>
  <script type="text/javascript"
    href="js/bootstrap.min.js">
  </script>
</body>
</html>

```

Example: In the example, it can be observed that the downloaded files from bootstrap are included under the head and body section. Now the bootstrap classes can directly be used.

As it is downloaded, thus no need for an internet connection required to load classes of bootstrap.

```
<!DOCTYPE html>
<html lang="en">
<head>
  <!-- Required meta tags -->
  <meta charset="utf-8" />
  <meta name="viewport" content=
    "width=device-width, initial-scale=1" />
  <link rel="stylesheet" type="text/css"
    href="css/bootstrap.css" />
</head>

<body>
  <h1>Welcome to GeeksforGeeks</h1>
  <div class="mb-3">
    <label for="exampleFormControlInput1"
      class="form-label">
      Email address
    </label>
    <input type="email" class="form-control"
      id="exampleFormControlInput1"
      placeholder="name@example.com" />
  </div>
  <div class="mb-3">
    <label for="exampleFormControlTextarea1"
      class="form-label">
      Example textarea
    </label>
    <textarea class="form-control"
      id="exampleFormControlTextarea1" rows="3">
  </textarea>
  </div>
  <script type="text/javascript"
    href="js/jquery.js">
  </script>
  <script type="text/javascript"
    href="js/bootstrap.min.js">
  </script>
</body>
</html>
```

Output:

Welcome to GeeksforGeeks

Email address

Example textarea

Self-Check Sheet 2: Interpret front-end framework components

- 1 What is Bootstrap?
 - a. A JavaScript library
 - b. A front-end framework
 - c. A back-end framework
 - d. A server-side language
- 2 Which feature makes Bootstrap a popular choice for web development?
 - a. Responsive design capabilities
 - b. Advanced animation effects
 - c. Backend database integration
 - d. Machine learning algorithms
- 3 What is the purpose of Bootstrap's grid system?
 - a. To create responsive layouts
 - b. To manage database connections
 - c. To handle user authentication
 - d. To generate dynamic content
- 4 How can you customize the styles in Bootstrap?
 - a. By editing the core Bootstrap files directly
 - b. By modifying the CSS classes in your HTML file
 - c. By using a separate CSS file to override Bootstrap styles
 - d. By running a customization script provided by Bootstrap
- 5 Which HTML element is used to create a navigation bar in Bootstrap?
 - a. <nav>
 - b. <header>
 - c.
 - d. <div>
- 6 Which class is used to create a responsive image in Bootstrap?
 - a. .img-responsive
 - b. .image-fluid
 - c. .responsive-img
 - d. .img-fluid
- 7 How can you add a modal dialog in Bootstrap?
 - a. Using the <modal> HTML element
 - b. Adding the .modal class to a <div>
 - c. Including the modal.js file in your project
 - d. Applying the .popup class to a <div>

- 8 Which class is used to create a responsive, mobile-friendly table in Bootstrap?
- a. `.table-responsive`
 - b. `.table-responsive-md`
 - c. `.table-fluid`
 - d. `.table-mobile`
- 9 How can you create a responsive carousel in Bootstrap?
- a. Using the `<carousel>` HTML element
 - b. Adding the `.carousel` class to a `<div>`
 - c. Including the `carousel.js` file in your project
 - d. Applying the `.slideshow` class to a `<div>`
- 10 Which class is used to create a progress bar in Bootstrap?
- a. `.progress-bar`
 - b. `.loading-bar`
 - c. `.progress-indicator`
 - d. `.status-bar`

Answer Key 2: Interpret front-end framework components

- 1 Answer: b
- 2 Answer: a
- 3 Answer: a
- 4 Answer: c
- 5 Answer: a
- 6 Answer: d
- 7 Answer: b
- 8 Answer: a
- 9 Answer: b
- 10 Answer: a

Job Sheet 2: Integrate Bootstrap

Objectives:

- Integrate the Bootstrap front-end framework into Project NSDA.
- Enhance the project's design and responsiveness using Bootstrap's components and utilities.
- Ensure cross-browser compatibility and consistent rendering across different devices.
- Customize Bootstrap to align with Project NSDA's visual style and branding.
- Document the integration process and provide guidelines for utilizing Bootstrap in the project.

Procedure:

1 Initial Assessment and Planning

- Review the project requirements and determine if Bootstrap is the appropriate choice.
- Discuss the selection with the project team and obtain approval.
- Identify any potential conflicts or adjustments needed if the project is already using a CSS framework or custom styles.

2 Interpretation of Bootstrap Documentation

- Familiarize yourself with the Bootstrap documentation available at <https://getbootstrap.com/docs/>.
- Study the documentation thoroughly to understand the various components, utilities, and layout options provided by Bootstrap.
- Take note of any specific features or functionalities that may be relevant to the project requirements.

3 Interpretation of Bootstrap Fundamentals

- Gain a solid understanding of the core principles and concepts of Bootstrap.
- Study the grid system, typography, responsive design, and CSS classes used in Bootstrap.
- Review the fundamental HTML structure and classes required for utilizing Bootstrap components effectively.

4 Bootstrap Integration

- Assess the current project structure and determine the appropriate approach for integrating Bootstrap.
- Download the latest version of Bootstrap from the official website or include it via a package manager.
- Include the necessary Bootstrap files (CSS, JavaScript, and optional theme files) into the project's directory structure.

5 Application of Bootstrap Classes and Components

- Identify the sections or elements of the project that would benefit from using Bootstrap components.
- Modify the project's HTML code to incorporate Bootstrap classes and structure.
- Implement the responsive grid system to ensure proper layout and alignment across different devices.
- Utilize Bootstrap's pre-designed components (e.g., navigation bars, buttons, forms) to enhance the project's visual and interactive elements.

6 Customization of Bootstrap (if required)

- Evaluate if the project requires a unique visual style or branding.
- Customize the default Bootstrap styles by modifying the provided Bootstrap variables or creating a custom CSS file.
- Ensure that the customization aligns with the project's overall design guidelines and requirements.

7 Testing and Iteration

- Conduct thorough testing of the integrated Bootstrap framework to ensure proper functionality and responsiveness.
- Test the project across different devices, browsers, and screen sizes to verify consistent rendering.
- Address any issues or bugs that arise during testing and make the necessary adjustments to the Bootstrap integration.

8 Documentation and Handover

- Document the steps taken to integrate Bootstrap into the project, including any customization or modifications made.
- Create a brief guide or README file explaining how to utilize Bootstrap classes and components in the project.
- Prepare any necessary handover materials or instructions for the development team or stakeholders.

Note: This procedure provides a general outline of the tasks involved in integrating Bootstrap into Project NSDA. It is important to adapt and customize the steps based on the specific requirements and scope of the project.

Specification Sheet-2 Integrate Bootstrap

Necessary tools and equipment

Sl. No	Name of Tools & Equipment	Specification	Unit	Quantity
1	Computer	Minimum Corei3 with 4GB RAM	Set	01
2	Web Browser (e.g., Google Chrome)	Latest Version	No.	01
3	Internet connections	High Speed	Set	01
4	Image processing software (e.g., Adobe Photoshop, GIMP)	Latest Version	No.	1

Learning Outcome 3: Use Bootstrap to create a layout

Assessment Criteria	<ol style="list-style-type: none"> 1. Bootstrap components are used 2. Mockup is created 3. Mockup is tested and presented
Conditions and Resources	<ol style="list-style-type: none"> 1. Applicable tools, utensils, and equipment as prescribed by competency standard. 2. Supply materials 3. Relevant ingredients 4. CBLM related to the learning outcome. 5. Instructions, job sheets, activity sheets, and standard operating procedures 6. Personal protective equipment 7. Module/reference
Contents	<ol style="list-style-type: none"> 1. Bootstrap Components 2. Mockups with Bootstrap 3. Testing and Presenting Mockups
Learning Materials	<ol style="list-style-type: none"> 1. CBLM 2. Handouts 3. Books, Manuals 4. Module/ Reference 5. Paper 6. Pen
Training Methods	<ol style="list-style-type: none"> 1. Discussion 2. Presentation 3. Demonstration 4. Guided Practice 5. Individual Practice 6. Project Work 7. Problem Solving 8. Brainstorming
Assessment Methods	<ol style="list-style-type: none"> 1. Written Test 2. Demonstration 3. Oral Questioning

Learning Experience 3: Use Bootstrap to create a layout

You must perform the learning steps below to achieve the objectives stated in this learning guide. Beside each step are the resources or special instructions you will use to accomplish the corresponding activity.

Learning Steps	Resources specific instructions
1. Students will ask the instructor about work with front-end framework	1. The instructor will provide the learning materials for use bootstrap to create a layout
2. Read the Information sheet/s	2. Information Sheet No: 3. Use Bootstrap to create a layout
3. Complete the Self-Checks & Answer key sheets.	3. Self-Check No: 3 Use Bootstrap to create a layout Answer key No. 3 Use Bootstrap to create a layout
4. Read the Job/ Task sheet and Specification Sheet	4. Job/ task sheet and specification sheet Job Sheet No: 3: Web application UI Enhancement Specification Sheet: 3 Web application UI Enhancement

Information Sheet 3: Use Bootstrap to create a layout

Learning Objective:

After completion of this information sheet, the learners will be able to explain, define and interpret the following contents:

- 3.1 Bootstrap Components
- 3.2 Optional JavaScript plugins
- 3.3 Mockups with Bootstrap
- 3.4 Testing and Presenting Mockups

3.1 Bootstrap Components

Bootstrap is a popular front-end framework that provides a collection of pre-designed components and CSS classes to help you build responsive and visually appealing web applications. Here's a guide on how to utilize Bootstrap components effectively:

- **Include Bootstrap:** Start by including the Bootstrap CSS and JavaScript files in your HTML document. You can either download the files and host them locally or use a CDN (Content Delivery Network) to include them from a remote server. Here's an example:

```
<!DOCTYPE html>
<html>
<head>
  <link rel="stylesheet"
href="https://cdn.jsdelivr.net/npm/bootstrap@5.3.0/css/bootstrap.min.css">
</head>
<body>
  <!-- Your content here -->
  <script
src="https://cdn.jsdelivr.net/npm/bootstrap@5.3.0/js/bootstrap.bundle.min.js"></script>
</body>
</html>
```

- **Layout Components:** Bootstrap provides layout components that help you structure your page, such as containers, grids, and responsive breakpoints. Use the container class to create a centered container for your content, and the row class to define rows within the container. Inside each row, you can use columns (e.g., col-md-6) to create a responsive grid system.

```
<div class="container">
  <div class="row">
```

```

<div class="col-md-6">
  <!-- Content for the first column -->
</div>
<div class="col-md-6">
  <!-- Content for the second column -->
</div>
</div>
</div>

```

- **Typography:** Bootstrap provides typography classes to style your text. You can apply different heading styles (h1 to h6) using classes like `display-1` or `h2`, adjust text alignment (`text-left`, `text-center`, `text-right`), or change the text color (`text-primary`, `text-success`, etc.).

```

<h1 class="display-1">Big Heading</h1>
<p class="text-center text-primary">Some text in the center with a primary color</p>

```

- **Buttons:** Bootstrap offers a variety of button styles that you can apply to `<button>` and `<a>` elements. Use classes like `btn`, `btn-primary`, `btn-secondary`, and more to create buttons with different colors and sizes.

```

<button class="btn btn-primary">Primary Button</button>
<a href="#" class="btn btn-danger">Danger Link</a>

```

- **Forms:** Bootstrap provides styles and layout options for forms. You can use classes like `form-control` to style input elements, `form-label` for labels, and `form-check` for checkboxes and radio buttons.

```

<form>
  <div class="mb-3">
    <label for="nameInput" class="form-label">Name</label>
    <input type="text" class="form-control" id="nameInput" placeholder="Enter your name">
  </div>
  <div class="form-check">
    <input class="form-check-input" type="checkbox" id="agreeCheck">
    <label class="form-check-label" for="agreeCheck">
      I agree to the terms and conditions
    </label>
  </div>
  <button type="submit" class="btn btn-primary">Submit</button>
</form>

```

- **Navigation:** Bootstrap provides navigation components like navbars, tabs, and pagination. You can create a responsive navbar using the navbar class, and include navigation links within a element. Use classes like nav-link and nav-item to style individual links.

```
<nav class="navbar navbar-expand-lg navbar-light bg-light">
  <div class="container">
    <ul class="navbar-nav">
      <li class="nav-item">
        <a class="nav-link" href="#">Home</a>
      </li>
      <li class="nav-item">
        <a class="nav-link" href="#">About</a>
      </li>
      <li class="nav-item">
        <a class="nav-link" href="#">Contact</a>
      </li>
    </ul>
  </div>
</nav>
```

These are just a few examples of Bootstrap components you can utilize. Bootstrap offers many more components like alerts, modals, carousels, and more. The official Bootstrap documentation (<https://getbootstrap.com/docs>) is an excellent resource to explore all the available components and their usage.

3.2 Optional JavaScript Plugins

Bootstrap provides optional JavaScript plugins that enhance the functionality of various components. These plugins add interactivity, additional features, and customizations to your Bootstrap-based website. Here are some popular optional JavaScript plugins you can utilize:

- **Tooltip:** The Tooltip plugin allows you to add interactive tooltips to elements on your page. To enable tooltips, you need to initialize the plugin and add the data-toggle="tooltip" attribute to the element you want to have a tooltip. You can customize the tooltip text, position, and other settings.

```
<!-- Initialize the Tooltip plugin -->
<script>
$(function () {
  $('[data-toggle="tooltip"]').tooltip();
```

```
});  
</script>
```

```
<!-- Add tooltip to an element -->  
<button type="button" class="btn btn-primary" data-toggle="tooltip" data-  
placement="top" title="Tooltip Text">Hover Me</button>
```

- **Popover:** The Popover plugin is similar to tooltips but provides more extensive content and interactions. It displays a small overlay with additional information when triggered by a user action. To enable popovers, you need to initialize the plugin and add the `data-toggle="popover"` attribute to the element you want to have a popover. You can customize the popover content, position, and other settings.

```
<!-- Initialize the Popover plugin -->  
<script>  
$(function () {  
  $('[data-toggle="popover"]').popover();  
});  
</script>
```

```
<!-- Add popover to an element -->  
<button type="button" class="btn btn-primary" data-toggle="popover"  
title="Popover Title" data-content="Popover Content">Click Me</button>
```

- **Collapse:** The Collapse plugin allows you to create collapsible content sections. It enables you to toggle the visibility of content by clicking on a trigger element. To use the Collapse plugin, you need to add the `data-toggle="collapse"` attribute to the trigger element and specify the target element with the `data-target` attribute.

```
<!-- Add collapse functionality -->  
<script>  
$(function () {  
  $('[data-toggle="collapse"]').collapse();  
});  
</script>  
<!-- Add collapse to a section -->  
<button type="button" class="btn btn-primary" data-toggle="collapse"  
data-target="#collapseExample" aria-expanded="false" aria-  
controls="collapseExample">
```

```

Toggle Content
</button>
<div class="collapse" id="collapseExample">
  <div class="card card-body">
    Content goes here
  </div>
</div>

```

- **Modal:** While modals don't require additional JavaScript for basic functionality, Bootstrap provides JavaScript events and methods to control modals programmatically. You can use these events and methods to open, close, or perform actions before/after the modal is shown or hidden.

```

// Show modal programmatically
$('#myModal').modal('show');
// Hide modal programmatically
$('#myModal').modal('hide');
// Perform actions after the modal is shown
$('#myModal').on('shown.bs.modal', function (event) {
  // Actions to be performed after modal is shown
});
// Perform actions after the modal is hidden
$('#myModal').on('hidden.bs.modal', function (event) {
  // Actions to be performed after modal is hidden
});

```

These are just a few examples of optional JavaScript plugins provided by Bootstrap. Bootstrap offers several other plugins like Scrollspy, Tab, Dropdown, and more. You can explore the Bootstrap documentation for these plugins to learn more about their usage and customization options: [Bootstrap JavaScript Plugins Documentation](#).

3.3 Creating Mockups with Bootstrap

Bootstrap can be a great tool for creating mockups due to its extensive collection of pre-designed components and responsive grid system. Here are some steps to help you create mockups using Bootstrap:

- **Identify Mockup Requirements:** Start by understanding the requirements and goals of your mockup. Consider the layout, content, and functionality you want to demonstrate.
- **Plan the Structure:** Use the Bootstrap grid system to plan the layout of your mockup. Determine the number of columns and their sizes based on the content you want to include. You can use the container, row, and col classes to create the desired structure.
- **Select Components:** Identify the Bootstrap components you want to use in your mockup. Components such as navigation bars, headers, cards, forms, and buttons can be useful for demonstrating various sections of your design. Refer to the Bootstrap documentation to explore the available components and their usage.
- **Build the Mockup:** Begin building your mockup by adding the necessary HTML structure and applying Bootstrap classes to the elements. Utilize the predefined classes for typography, buttons, forms, tables, and other components to achieve the desired visual appearance.
- **Customize the Styling:** Customize the default Bootstrap styling to match your mockup's **Add Interactivity:** design. You can override the default CSS properties by adding custom CSS classes or modifying the existing classes. This allows you to create a unique look and feel for your mockup.
- If your mockup requires interactive elements such as dropdowns, modals, or carousels, incorporate the appropriate Bootstrap JavaScript plugins and add the necessary JavaScript code. You can use JavaScript/jQuery to handle events, perform actions, and showcase the functionality of your mockup.
- **Test Responsiveness:** Ensure that your mockup is responsive by testing it on different devices and screen sizes. Bootstrap's responsive grid system will automatically adjust the layout based on the device width, but it's important to verify that your mockup looks and functions well on various screen sizes.
- **Iterate and Refine:** Iterate on your mockup, gather feedback, and refine your design as necessary. Use the flexibility of Bootstrap to make adjustments and improvements to your mockup based on user feedback and requirements

Remember, Bootstrap is a powerful framework that provides a solid foundation for creating mockups quickly. However, it's essential to customize and extend Bootstrap to suit your specific design needs and branding guidelines.

By following these steps, you can leverage Bootstrap's components, responsive grid system, and customization options to create visually appealing and interactive mockups.

3.4 Testing and Presenting Mockups

Testing and presenting your mockups is an important step in the design process to gather feedback, validate your design decisions, and ensure the effectiveness of your solution. Here are some suggestions for testing and presenting your Bootstrap mockups:

- **User Testing:** Conduct user testing sessions with a diverse group of users who represent your target audience. Provide them with specific tasks or scenarios to accomplish using your mockup. Observe their interactions, gather feedback, and note any usability issues or areas for improvement. User testing can be done in-person or remotely using screen sharing tools or prototyping platforms.
- **Clickable Prototypes:** Convert your mockups into clickable prototypes using tools like InVision, Figma, or Adobe XD. Link the different screens or components together to create a navigable prototype that simulates user interactions and flows. This allows stakeholders and users to experience the mockup in an interactive way and provides a more realistic representation of the final product.
- **Presentation Deck:** Prepare a presentation deck to showcase your mockups and design decisions. Use slides to introduce the project goals, user needs, and design considerations. Include screenshots or interactive prototype previews to visually demonstrate your mockups. Explain the functionality, user flow, and key features of your design. This presentation can be used for internal design reviews, stakeholder meetings, or client presentations.
- **Contextualize the Mockups:** Provide context for your mockups by explaining the problem you're addressing, the user pain points you're solving, and the benefits your design brings. Help stakeholders and clients understand how your mockups align with project objectives and user needs. Use real-world examples or scenarios to illustrate the value and impact of your design.
- **Gather Feedback:** Actively seek feedback from stakeholders, clients, and users. Encourage open and constructive discussions to understand their perspectives, concerns, and suggestions. Capture feedback in a structured manner, such as through feedback forms or collaborative tools like Google Docs or project management platforms. Consolidate and analyze the feedback to identify common themes and areas of improvement.
- **Iterate Based on Feedback:** Incorporate the feedback received into your mockups. Iterate on your design, making necessary adjustments and refinements. Address any usability issues, improve visual elements, and align the mockups with the feedback and insights gathered. Repeat the testing and presentation process if required to validate the effectiveness of your updated mockups.

- **Document Design Decisions:** Maintain a record of the design decisions you made during the mockup creation process. Document the rationale behind your design choices, including the usability principles, user research insights, and feedback considerations. This documentation serves as a reference and helps in explaining your design decisions to stakeholders and team members.
- **Collaborative Tools:** Use collaborative tools to share your mockups and gather feedback from distributed teams or clients. Platforms like InVision, Figma, or Miro allow for real-time collaboration, annotations, and discussions on specific design elements. This promotes effective communication and facilitates remote collaboration.
- **Usability Testing:** Usability testing involves observing users as they interact with your mockups to identify any usability issues or areas of improvement. It helps you understand how users navigate through your design, where they encounter difficulties, and how they interpret and interact with different components. Usability testing can be conducted through moderated sessions, where a facilitator guides users through tasks, or unmoderated sessions, where users perform tasks independently. Consider recording the sessions for later analysis and to capture valuable insights.
- **A/B Testing:** A/B testing (also known as split testing) involves creating two or more versions of your mockups and testing them with different groups of users to determine which version performs better. This testing method allows you to compare different design variations, such as layout, color scheme, or wording, and gather data-driven insights to inform your design decisions. A/B testing can be conducted using specialized tools or platforms that track user interactions and measure key metrics.
- **Remote Testing:** Remote testing allows you to gather feedback and insights from users who may not be physically present in the same location as you. You can conduct remote usability testing sessions using screen-sharing tools or remote user testing platforms. Remote testing offers flexibility and allows you to reach a wider audience, including users from different geographical locations.
- **Contextual Inquiry:** Contextual inquiry involves observing users in their natural environment as they interact with your mockups. By observing users in their real-world context, you can gain a deeper understanding of their needs, behaviors, and pain points. This method helps you gather rich qualitative data and uncover insights that may not emerge in a controlled testing environment. Contextual inquiry can be conducted through on-site visits, remote video calls, or ethnographic research methods.
- **Design Critiques:** Conduct design critiques with your team or stakeholders to gather feedback and generate discussions around your mockups. Design critiques involve presenting your mockups to a group of people who provide constructive feedback, identify potential issues, and suggest improvements. This collaborative approach

allows you to leverage diverse perspectives and tap into the collective expertise of the participants. Consider establishing clear guidelines for the critique session to ensure a focused and productive discussion.

- **Demonstrating Interactivity:** When presenting your mockups, emphasize the interactive elements and functionality to showcase how users would engage with your design. Use your clickable prototypes or live demos to walk through different user flows and demonstrate key interactions. This helps stakeholders and clients visualize the user experience and provides a more immersive understanding of your design concept.
- **User Surveys:** Conduct surveys to collect quantitative and qualitative feedback from a larger sample of users. Surveys allow you to gather insights on specific aspects of your mockups, such as visual appeal, ease of use, or overall satisfaction. Online survey tools like Google Forms or SurveyMonkey can be utilized to create and distribute surveys. Consider including both closed-ended questions (e.g., Likert scale rating) and open-ended questions to capture detailed feedback and suggestions.
- **Visual Design Presentations:** When presenting your mockups, pay attention to visual design aspects such as typography, color scheme, and overall aesthetics. Explain your design choices, including the rationale behind your color palette, typography selection, and visual hierarchy. Present your mockups in a visually appealing and engaging manner to effectively communicate your design vision.

Remember to approach testing and presenting mockups as an iterative process. Use the feedback and insights gathered to refine your design, make informed decisions, and continually improve the user experience. Effective testing and presentation techniques help ensure that your mockups align with user needs, project goals, and stakeholder expectations.

Self-Check Sheet 3: Use Bootstrap to create a layout

Questions:

1. What is the purpose of the Bootstrap grid system?

Answer:

2. Name two Bootstrap components used for user input and form validation.

Answer:

3. How can you create a collapsible content section using Bootstrap?

Answer:

4. Which Bootstrap component is used to display tabbed content?

Answer:

5. How can you create a responsive navigation bar using Bootstrap?

Answer:

6. What is the purpose of the Bootstrap Modal component?

Answer:

7. How can you add a tooltip to an element using Bootstrap?

Answer:

8. How can you create a carousel of images using Bootstrap?

Answer:

9. What is the purpose of the Bootstrap Jumbotron component?

Answer:

10. How can you create a table with striped rows using Bootstrap?

Answer:

Answer Key 3: Use Bootstrap to create a layout

1. What is the purpose of the Bootstrap grid system?

Answer: The Bootstrap grid system helps create responsive and flexible layouts by dividing the page into a grid of rows and columns.

2. Name two Bootstrap components used for user input and form validation.

Answer: Two Bootstrap components used for user input and form validation are the `<input>` elements and the `<form>` component

3. How can you create a collapsible content section using Bootstrap?

Answer: You can create a collapsible content section using the Bootstrap Collapse component by adding the `data-toggle="collapse"` attribute to the trigger element and specifying the target element with the `data-target` attribute

4. Which Bootstrap component is used to display tabbed content?

Answer: The Tabs component is used to display tabbed content in Bootstrap

5. How can you create a responsive navigation bar using Bootstrap?

Answer: You can create a responsive navigation bar using the Bootstrap Navbar component by wrapping your navigation links and content in the appropriate HTML structure and applying the necessary CSS classes

6. What is the purpose of the Bootstrap Modal component?

Answer: The Bootstrap Modal component is used to display a dialog box or pop-up window over the current page to provide additional information or request user input

7. How can you add a tooltip to an element using Bootstrap?

Answer: To add a tooltip to an element, you can use the `data-toggle="tooltip"` attribute and provide the tooltip content using the `title` attribute or JavaScript/jQuery

8. How can you create a carousel of images using Bootstrap?

Answer: You can create a carousel of images using the Bootstrap Carousel component by adding the necessary HTML structure, including the carousel indicators and slides, and applying the appropriate CSS classes

9. What is the purpose of the Bootstrap Jumbotron component?

Answer: The Bootstrap Jumbotron component is used to display a large, prominent section on a page to attract attention or highlight important information

10. How can you create a table with striped rows using Bootstrap?

Answer: You can create a table with striped rows using Bootstrap by applying the `table-striped` class to the `<table>` element

Job Sheet 3: Web Application UI Enhancement

Objectives:

- 1) Integrate Bootstrap components into the existing web application codebase.
- 2) Create a visually appealing mockup incorporating Bootstrap components.
- 3) Test the functionality and responsiveness of the mockup.
- 4) Present the finalized mockup to stakeholders for feedback and approval.

Procedure:

1. Bootstrap Components Integration:

- Identify the Bootstrap components required for the web application, considering the desired UI/UX enhancements.
- Evaluate the existing codebase to determine the integration strategy and ensure compatibility with Bootstrap.
- Incorporate the Bootstrap framework into the project, following best practices and guidelines.
- Modify the relevant HTML, CSS, and JavaScript files to integrate Bootstrap classes and components effectively.
- Ensure consistent styling and responsiveness across different browsers and devices.

2. Mockup Creation:

- Collaborate with the UI/UX team to gather design requirements, including layout, color schemes, and typography.
- Familiarize yourself with the targeted user experience and design guidelines to create a cohesive mockup.
- Utilize industry-standard design software (e.g., Adobe XD, Sketch, Figma) to design the mockup.
- Implement the desired layout, incorporating the identified Bootstrap components seamlessly.
- Pay attention to responsive design principles to ensure the mockup adapts well to different screen sizes.

3. Mockup Testing:

- Conduct a thorough review of the created mockup for design inconsistencies, visual glitches, or usability issues.
- Test the functionality of the Bootstrap components used in the mockup, ensuring they perform as intended.
- Verify that user interactions, such as buttons, forms, and navigation, work smoothly in the mockup.
- Test the mockup's responsiveness across various devices and screen sizes to ensure consistent user experience.
- Document any issues or bugs encountered during testing for further analysis and resolution.

4. Mockup Presentation:

- Schedule a meeting or presentation session with project stakeholders to showcase the finalized mockup.
- Prepare a compelling presentation that highlights the key features and design elements of the mockup.
- Demonstrate the functionality and user interactions supported by the Bootstrap components.
- Explain the rationale behind the selection and implementation of Bootstrap components, emphasizing their value.
- Address questions and concerns raised by stakeholders regarding the mockup design and functionality.
- Gather feedback from stakeholders to make any necessary refinements to the mockup before finalizing.

Note: Regular collaboration with the UI/UX team and effective communication with stakeholders are crucial throughout the process to ensure alignment with project objectives and requirements.

Specification Sheet-3: Web Application UI Enhancement

Necessary tools and equipment

Sl. No	Name of Tools & Equipment	Specification	Unit	Quantity
1	Computer	Minimum Corei3 with 4GB RAM	Set	01
2	Web Browser (e.g., Google Chrome)	Latest Version	No.	01
3	Internet connections	High Speed	Set	01
4	Image processing software (e.g., Adobe Photoshop, GIMP)	Latest Version	No.	1

Review of Competency

Below is your assessment rating for module **Work with Front-end Framework**

Assessment of Performance Criteria	Yes	No
A responsive website is interpreted.		
The advantages of the Frontend Framework in a responsive website are interpreted.		
Bootstrap Front-end framework is selected		
Bootstrap documentation is interpreted		
Fundamentals of Bootstrap is interpreted.		
Bootstrap is integrated.		
Bootstrap components are used		
Mockup is created		
Mockup is tested and presented		

I now feel ready to undertake my formal competency assessment.

Signed:

Date:

Reference

https://www.google.com/search?q=Data+Layer&tbm=isch&ved=2ahUKEwi0o9DW1tGBAxU UjmMGHaBZBEIQ2-cCegQIABAA&oq=Data+Layer&gs_lcp=CgNpbWcQAzIFCAAQgAQyBQgAEIAEMgUIABCABDIFCAAQgAQyBQgAEIAEMgUIABCABDIFCAAQgARQ1QZY7xNg0xZoAHAAeACAAdcBiAHXCJIBBTauNC4ymAEAoAEBggELZ3dzLXdpei1pbWfAAQE&sclient=img&ei=KLwXZfTvKpScjuMPoLORkAQ&bih=629&biw=1366&hl=en#imgrc=G30Pvdc79Lk2QM

https://www.google.com/search?q=XAMPP%2C+WAMP%2C+MAMP%2C+and+LAMP&sc_e sv=569660528&hl=en&tbm=isch&source=hp&biw=1366&bih=629&ei=I7wXZc-IFfbi2roPyK2AwAI&iflsig=AO6bgOgAAAAAZRfKMy7gVqgROIsU4in5HyWY6hDrV-nv&ved=0ahUKEwiPponU1tGBAxV2sVYBHcgWACgQ4dUDCAc&uact=5&oq=XAMPP%2C+WAMP%2C+MAMP%2C+and+LAMP&gs_lp=EgNpbWciG1hBTVBQLCBXQU1QLCBNQU1QLCBhbmQgTEFNUEiBEICcBVjpD3ABeACQAQCYAa4BoAHMAqoBAzAuMrgBA8gBAPgBAvgBAYoCC2d3cy13aXotaW1nqAIA&sclient=img#imgrc=NhjcFF8drA0YHM

<https://www.google.com/imghp?hl=en&tab=ri&ogbl>

Development of CBLM:

The Competency Based Learning Material (CBLM) of ‘**Work with Front-end Framework**’ (Occupation: Web Design, Level-3) for National Skills Certificate is developed by NSDA with the assistance of SIMEC System, ECF consultancy & SIMEC Institute JV (Joint Venture Firm) in the month of June 2023 under the contract number of package SD-9A dated 07th May 2023.

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